

CLAIMS

1. A transponder reader arranged to read data from transponders, wherein each of said transponders send data according to one transponder signalling protocols,

5 - said transponder signalling protocol is selected from a number of different transponder signalling protocols, and

- a first and a second transponder signals according to the same or different protocols,

10 - said transponder reader comprises an antenna means for sending a first analogue signal to one of said transponders and receiving a second analogue signal from said transponders, and

15 - said transponder reader further comprises means for analysing said signal received by said antenna means **characterised in that**

- said transponder reader comprises a digital processing means,

20 - said transponder reader comprises an analogue to digital converter arranged to receive said second analogue signal from said antenna means, convert said second analogue signal to a first digital signal and supply said first digital signal to said digital processing means,

25 - said digital processing means comprises analysing means arranged to analyse said received digital signals according to at least two different transponder signalling protocols.

30 2. The transponder reader according to claim 1, wherein said analysing means comprises first demodulating, detecting and decoding means for demodulating, detecting and decoding digital signals according to a first transponder

signalling protocol and second demodulating, detecting and decoding means for demodulating, detecting and decoding digital signals according to a second transponder signalling protocol

- 5 3. The transponder reader according to claim 1 or 2, wherein said transponder reader further comprises transmitting means for sending said analysed first digital signal to post-processing means.
- 10 4. The transponder reader according to any of claims 1-3, wherein
- said antenna means comprises means for controlling the antenna characteristics,
 - said antenna means comprises a digital interface for receiving digital messages from said digital processing means and transmitting digital messages to said digital processing means,
 - 15 - said antenna means controls said antenna characteristics in dependence of said received digital messages, and
 - 20 - said antenna means transmit digital messages relating to the antenna characteristics to said digital processing means.
- 25 5. The transponder reader according to claim 4, wherein said digital messages comprises information selected from the group of information comprising: antenna ready to send, antenna on line, output amplification, and frequency tuning coefficients.
- 30 6. The transponder reader according to any of claims 1-5, wherein
- each of said at least two protocols are selected from the group of protocols including: half-duplex protocols,

full-duplex protocols, proprietor protocols (B-protocol) and read/write protocols.

7. The transponder reader according to any of the claims above, wherein

- said digital processing means supply second digital signals to a digital to analogue converter for converting said digital signal to said first analogue signal,
- said digital to analogue converter supplies said first analogue signal to said antenna means for transmission.

8. The transponder reader according to claim 1 or 2, wherein

- said digital processing means comprises means for demodulating said first digital signal according to a first and at least a second demodulation scheme.

9. The transponder reader according to claim 8, wherein

- said digital processing means comprises means for detection of symbols from said demodulated digital signal according to a first and at least a second symbol detection scheme.

10. The transponder reader according to claim 9, wherein

- said digital processing means comprises means for decoding symbols from said detected symbols according to a first and at least a second symbol decoding scheme.

11. The transponder reader according to claim 10, wherein

- said decoding comprises or consists of performing an error detection check e.g. a cyclic redundancy check.

12. The transponder reader according to claim 10, wherein

- said transponder reader comprises means for detecting which of said first and at least second means for demodulating, detection, and decoding that produces the best signal detection quality and using said means.

13. The transponder reader according to claim 10, wherein
- an operator selects which demodulator, detector and
decoder to be used by said digital processing means.

5 14. The transponder reader according to claim 1, wherein
- said one of at least two different transponder
signalling protocols is a full duplex protocol, and
- said first analogue signal is subtracted from said
second analogue signal to remove the contribution from
the first analogue signal from the reception of said
10 second analogue signal.

15. The transponder reader according to claim 14, wherein
- said first analogue signal is boosted before being
subtracted from said second analogue signal.

15 16. The transponder reader according to claim 1, wherein
- said transponder reader comprises means for deciding
which of at least said two different transponder
signalling protocols that said transponder is using in
responding to said first analogue signal, and using said
protocol.

20 17. The transponder reader according to claim 16, wherein
- said decision is performed in a start up sequence and
that said transponder reader assumes that all
transponders are working according to said detected
protocol.

25 18. The transponder reader according to claim 1, wherein
- an operator selects the appropriate transponder
signalling protocol.

30 19. The transponder reader according to claim 4, wherein
- said transponder reader comprises means for setting
antenna characteristics in dependence of detected

environmental characteristics so as to achieve optimal signalling detection quality in relation to the electromagnetic environment.

20. The transponder reader according to claim 9, wherein
5 - the phase of said first analogue signal is controlled.

21. A method for reading data from transponders, wherein
each of said transponders send data according to one
transponder signalling protocols,
10 - said transponder signalling protocol is selected from a
number of different transponder signalling protocols, and
- a first and a second transponder signals according to
the same or different protocols, comprising
- sending a first analogue signal to one of said
transponders and receiving a second analogue signal from
15 said transponders using an antenna means, and
- analysing said second analogue signal received by said
antenna means,

characterised in the steps of:

20 - converting said second analogue signal from the
analogue domain to a first digital signal in the digital
domain,
- supplying said first digital signal to digital
processing means,
- analysing said received first digital signal using said
25 digital processing means for establishing which of at
least two different transponder signalling protocols said
transponder uses,
- selecting said established one of said at least two
different transponder signalling protocols, and
30 - analysing said first digital signal according to said
selected transponder signalling protocol.

22. The method according to claim 21, wherein said analysing comprises demodulating, detecting and decoding digital signals according to a first and at least a second transponder signalling protocol.

5 23. The method according to claim 21 or 22, further comprising the step of sending said analysed first digital signal to post-processing means.

24. The method according to claim 21, wherein
- said antenna means comprises means for controlling the
10 antenna characteristics,
- said antenna means comprises a digital interface for receiving digital messages from said digital processing means and transmitting digital messages to said digital processing means, and characterised by the further steps
15 of
- controlling said antenna characteristics in dependence of said received digital messages, and
- transmitting digital messages from said antenna means relating to the antenna characteristics to said digital
20 processing means.

25. The method according to claim 24, wherein said digital messages comprises information selected from the group of information comprising: antenna ready to send, antenna on line, output amplification, and frequency
25 tuning coefficients.

26. The method according to any of claims 21-25, wherein
- each of said at least two protocols are selected from the group of protocols including: half-duplex protocols, full-duplex protocols, propriotor protocols (B-protocol),
30 and read/write protocols.

27. The method according to any of claims 21-26, wherein
- supplying second digital signals, from said digital
processing means to a digital to analogue converter for
converting said digital signal to said first analogue
signal,
- supplying said first analogue signal, from said digital
to analogue converter to said antenna means for
transmission.
28. The method according to claim 21, wherein
- said digital processing means comprises means for
demodulating said first digital signal according to a
first and at least a second demodulation scheme.
29. The method according to claim 28, wherein
- said digital processing means comprises means for
detection of symbols from said demodulated digital signal
according to a first and at least a second symbol
detection scheme.
30. The method according to claim 29, wherein
- said digital processing means comprises means for
decoding symbols from said detected symbols according to
a first and at least a second symbol decoding scheme.
31. The method according to claim 30, wherein
- said decoding comprises or consists of performing a
error detection check e.g. a cyclic redundancy check.
32. The method according to claim 30, comprising the
steps of:
- detecting which of said first and at least second means
for demodulating, detection, and decoding that produces
the best signal detection quality and using said means.

33. The method according to claim 30, wherein
- an operator selects which demodulator, detector and decoder to be used by said digital processing means.

5 34. The method according to claim 21, wherein
- said one of at least two different transponder signalling protocols is a full duplex protocol, and characterised in the further steps of:
- subtracting said first analogue signal from said second analogue signal to remove the contribution from the first
10 analogue signal from the reception of said second analogue signal.

35. The method according to claim 34, comprising the step of:
- boosting said first analogue signal before subtracting
15 said first analogue signal from said second analogue signal.

36. The method according to claim 21, comprising the step of:
- deciding which of at least said two different
20 transponder signalling protocols that said transponder is using in responding to said first analogue signal and using said protocol.

37. The method according to claim 36, comprising the step of:
25 - performing said decision in a start up sequence and assuming that all transponders are working according to said detected protocol.

38. The method according to claim 21, wherein
- an operator selects the appropriate transponder
30 signalling protocol.

39. The method according to claim 24, comprising the step of:

- setting antenna characteristics in dependence of detected environmental characteristics so as to achieve optimal signalling detection quality in relation to the electromagnetic environment.

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40. The method according to claim 24, wherein

- controlling the phase of said first analogue signal.